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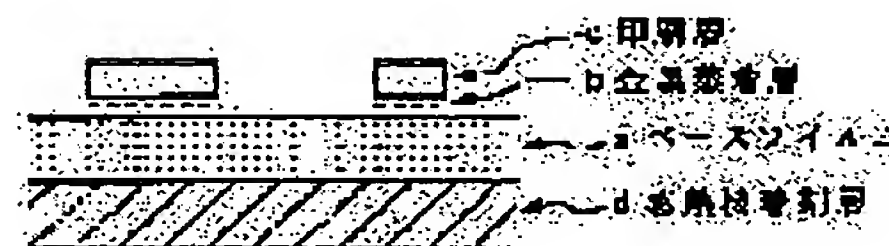
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## (54) PAPER FOR PREVENTING FORGERY

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To obtain thread-containing paper for preventing forgery, enabling to simply judge the front and back surfaces of a thread, even when the thread only on whose one side a heat-sensitive adhesive is coated is used, and enabling to easily read microletters of only positive letters on the thread by inserting the thread toward the flow of the paper.

**SOLUTION:** A thread comprises a base film (a), microletters of only positive letters comprising metal-deposited layers (b) formed on the surface of the film, a printed layer (c) formed on the metal-deposited layer and comprising a transparent ink, and a heat-sensitive adhesive layer (d) formed on the back surface of the film, and a dye or pigment capable of being developed by the irradiation of UV light is added to the ink forming the printed layer. The thread is inserted into paper on the production of the paper so that the microletters of positive letters can be seen from the back side of the paper. The side on which the developed color of the printed layer by the irradiation of UV light can be seen can be judged to be the front surface of the thread.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the forged prevention form which inserted the thread in the flow direction of a form said thread The micro alphabetic character of only the forward alphabetic character which consists of a metal vacuum evaporationo layer formed in the front face of the film used as the base, and said film, and/or the micro image of only a forward image, It consists of a printing layer by the invisible writing ink formed on said metal vacuum evaporationo layer, and a sensible-heat adhesives layer formed in the rear face of said film. The forged prevention form characterized by inserting said thread in a form so that the micro alphabetic character of a forward alphabetic character and/or the micro image of a forward image may appear when the dyes and pigments colored by the exposure of ultraviolet rays are added by the ink which forms said printing layer and it sees from the side front of a form.

[Claim 2] In the forged prevention form which inserted the thread in the flow direction of a form said thread The micro alphabetic character of only the reverse alphabetic character which consists of a metal vacuum evaporationo layer formed in the rear face of the bright film used as the base, and said film, and/or the micro image of only a reverse image, It consists of a printing layer in the ink formed on said metal vacuum evaporationo layer, and a transparent sensible-heat adhesives layer formed in the rear face of said film so that said printing layer top might be covered. The dyes and pigments colored by the exposure of ultraviolet rays are added by the ink which forms said printing layer. The forged prevention form characterized by inserting said thread in a form so that the micro alphabetic character of a reverse alphabetic character and/or the micro image of a reverse image may appear through a bright film as the micro alphabetic character of a forward alphabetic character, and/or micro images of a forward image when it sees from the side front of a form.

[Claim 3] The forged prevention form according to claim 1 or 2 characterized by forming in the flow direction of a form the aperture aperture section which made thickness thin intermittently on the side front of a form, and said thread being exposed to this aperture aperture section.

[Claim 4] The forged prevention form according to claim 3 characterized by setting to 3:1-1:2 the ratio of the die length (X) of said aperture aperture section in the flow direction of a form, and the die length (Y) of the non-aperture aperture section located between the aperture aperture section and the aperture aperture section.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention relates to the forged prevention form of the so-called "paper containing thread" type with which the thread which has a micro alphabetic character and/or a micro image was inserted in the flow direction of a form.

**[0002]**

**[Description of the Prior Art]** The forged prevention form called "the paper containing yarn" which inserted the filament into paper is known well. As a typical example of this filament, a thread is behind so that it may state in detail. it is \*\*\*\*\* about these -- since a form needs a very advanced technique for manufacture, big effectiveness is in forged prevention and they are used for it as everyone knows. [ in the bill of each country etc. ] [ many ]

**[0003]** It roughly divides into the paper containing yarn, and there are two kinds of them. One is the thing of the class which a filament is inserted in the interior of a form and exposed to a form front face, and another is called "the paper containing aperture aperture yarn" which some filaments exposed to the form front face.

**[0004]** As an approach of manufacturing the former form, a nozzle is put in into the flow of the pulp of the slice part of a Fortlinear paper machine. A filament in the web which lets out a filament to a nozzle with a sink and is formed in it in water at a paper-making network The \*\*\*\*\* approach (JP,51-130309,A), The insertion equipment of a filament is installed to the pulp which flows out of the flow box of a Fortlinear paper machine. A cylinder machine with the \*\*\*\*\* approach (JP,2-169790,A) and two tubs or more for a thread is used making a filament and pulp into a non-contact condition by airstream. By \*\*\*\* doubling more than two-layer A filament is sent out between paper using the duct which prepared irregularity in the wall, and the \*\*\*\*\* approach (JP,5-40080,B) etc. is proposed in the filament between paper.

**[0005]** As an approach of manufacturing the latter "paper containing aperture aperture yarn" The approach (JP,5-85680,B) of burying and manufacturing the belt device in which it has the slot which let the filament pass, to the pulp suspension on a wire at the head of heights of the guide which has the concavo-convex section, The network processed in the shape of irregularity is used for the upper network of a cylinder machine, and it inserts, contacting a thread in the concavo-convex section on the front face of a network. A filament into an aperture aperture part The \*\*\*\*\* approach (U.S. Pat. No. 4462866), A compressed-air nozzle is made to build in in the rotating drum on the wire of a Fortlinear paper machine, and the approach (JP,6-272200,A) of blowing away intermittently the slurry on the filament beforehand inserted in the web by the compressed air, and exposing a filament etc. is proposed.

**[0006]** It is the description that "the paper containing an aperture aperture thread" which used the thread as a filament formed in the flow direction of a form the aperture aperture section which made thickness thin intermittently, and the thread is exposed in this aperture aperture section. Therefore, in the form which manufactured adhesives on the front face using the thread which has not carried out coating, since a thread will separate simply or a thread will come floating at the time of printing if the outcrop of a thread is rubbed by a pawl etc., it becomes a fatal fault. For this reason, in case paper making of the paper containing an aperture aperture thread is carried out using the thread which carried out coating of the sensible-heat adhesives to table flesh-side both sides and this form is dried in the desiccation zone of a paper machine, the cellulose fiber and the thread which constitute a form for the sensible-heat adhesives by which coating is carried out to the thread melting or by softening are pasted up certainly, and the measures which raise peel strength are taken. Whichever the field of a thread is inserted in a form, coating of the sensible-heat adhesives is carried out to both sides of a



thread, because good adhesive strength is obtained.

[0007]

[Problem(s) to be Solved by the Invention] In the forged prevention form of the type containing an aperture aperture thread, if coating of the sensible-heat adhesives is carried out to both sides of a thread, the field of the thread exposed in the aperture aperture section of a form will contact a cylinder dryer, canvas, a touch roll, etc. inevitably in the middle of the desiccation zone of a paper machine, with heat, it will soften and sensible-heat adhesives will cause melting or the problem which pollutes front faces, such as a cylinder dryer. Moreover, by contacting a cylinder dryer etc., the smooth nature of the sensible-heat adhesives by which coating was carried out to the thread side exposed in the aperture aperture section is lost, and photoluminescent causes the problem which falls remarkably in the thread of a type which has especially a metal vacuum evaporation layer. Moreover, when the thread which has a metal vacuum evaporation layer is exposed in the aperture aperture section, the problem as for which a metal vacuum evaporation layer becomes is easy to be corroded by the sensible-heat adhesives by which coating was carried out on the metal vacuum evaporation layer being removed selectively is caused.

[0008] Moreover, in order to manufacture the thread which carried out coating of the sensible-heat adhesives to both sides, the approach of carrying out the slit of the film used as the original fabric which carried out coating of the sensible-heat adhesives by the micro slitting machine is adopted as both sides, but when the usual coater is used, it becomes difficult to carry out coating of the sensible-heat adhesives to both sides of a film. That is, it is because it fuses in case the sensible-heat adhesives which carried out coating to one field of a film first carry out coating of the sensible-heat adhesives to the 2nd time in the field of another side, and it adheres to a touch roll. Therefore, it is necessary to choose the sensible-heat adhesives of a class with which melting temperature differs or, and a troublesome cure is needed using a floating desiccation method etc.

[0009] It tried to insert a thread at the time of paper making of a form so that this invention persons may inquire wholeheartedly in order to cancel the above-mentioned trouble, the thread which carried out coating of the sensible-heat adhesives only to one side might be manufactured first and the thread side (thread rear face) where the thread side (thread front face) which has not carried out coating of the sensible-heat adhesives was exposed in the aperture aperture section of a form, and carried out coating of the sensible-heat adhesives might touch the interior of a form. However, since there is no table rear face of a thread by this approach and there was no difference by appearance, it was dramatically difficult to judge by viewing and others whether on the occasion of the thread insertion at the time of paper making, the table rear face was inserted in the state of the right. Although the method of judging whether the obtained form was sampled in the rolling-up section of a paper machine, the exfoliation force of the thread and form which have been exposed in the aperture aperture section of a form was measured, and the thread was inserted normally is also considered \*\* -- by the judgment approach [ like ], since the form of remarkable die length will be milled when the abnormalities in insertion of a thread are judged, the yield falls dramatically, and in milling the form which also inserted many threads especially in the cross direction of a form, lowering of such a yield poses a very big problem.

[0010] On the other hand, a micro alphabetic character and a micro image are formed in a thread, and heightening the forged prevention effectiveness further is also performed. In this case, the design which consists of combination of "a forward alphabetic character" and a "reverse alphabetic character" as shown in drawing 11 is used for the micro alphabetic character formed in a thread. Since it is very difficult to control the table rear face of a thread and to insert in a form, such a design is adopted for making it good, whichever the field of a thread is inserted in a form. However, there is not only sense of incongruity, but the micro alphabetic character in which "the forward alphabetic character" and the "reverse alphabetic character" are intermingled has the fault of being hard to read since they are minute.

[0011] Then, even if the thread which carried out coating of the sensible-heat adhesives only to one side is used for this invention When the table rear face is made easy and promptly identifiable, consequently the table rear face of a thread is not correctly inserted on the occasion of paper milling, this can be judged promptly and it can return to a right insertion condition. Let it be a technical problem to offer the forged prevention form containing a thread which enabled it to see the micro image of only the micro alphabetic character of only a forward alphabetic character, or a forward image on a thread furthermore.

[0012]

[Means for Solving the Problem] Namely, the forged prevention form by the 1st embodiment of this invention In the forged prevention form which inserted the thread in the flow direction of a form said thread The micro alphabetic character of only the forward alphabetic character which consists of a metal vacuum evaporation

layer b formed in the front face of the film a used as the base, and said film when explained with reference to drawing 6 , and/or the micro image of only a forward image, It consists of a printing layer c by the invisible writing ink formed on said metal vacuum evaporation layer, and a sensible-heat adhesives layer d formed in the rear face of said film. When the dyes and pigments colored by the exposure of ultraviolet rays are added by the ink which forms said printing layer and it sees from the side front of a form, it is characterized by inserting said thread in a form so that the micro alphabetic character of a forward alphabetic character and/or the micro image of a forward image may appear.

[0013] Furthermore the forged prevention form by the 2nd embodiment of this invention In the forged prevention form which inserted the thread in the flow direction of a form said thread The micro alphabetic character of only the reverse alphabetic character which will be set to bright film a used as the base from the metal vacuum evaporation layer b formed in the rear face of said film if it explains with reference to drawing 7 , and/or the micro image of only a reverse image, It consists of a transparent sensible-heat adhesives layer d formed in the rear face of said film so that said printing layer [ in the ink formed on said metal vacuum evaporation layer ] c and printing layer top might be covered. The dyes and pigments colored by the exposure of ultraviolet rays are added by the ink which forms said printing layer. When it sees from the side front of a form, it is characterized by inserting said thread in a form so that the micro alphabetic character of a reverse alphabetic character and/or the micro image of a reverse image may appear through a bright film as the micro alphabetic character of a forward alphabetic character, and/or micro images of a forward image.

[0014] In the forged prevention form of this invention, a thread is inserted so that the field (thread rear face) of a thread where coating of the sensible-heat adhesives is carried out for the field (thread front face) of a thread where coating of the sensible-heat adhesives is not carried out to the side front of a form may turn to the background of a form. therefore, when it considers as "the paper containing an aperture aperture thread" which the aperture aperture section which made thickness thin intermittently was formed [ paper ] in the side front of a form, and made this aperture aperture section expose a thread to the flow direction of a form Since coating of the sensible-heat adhesives is not carried out, even if the thread front face exposed to the aperture aperture section contacts the cylinder dryer of a desiccation zone, canvas, a touch roll, etc., it does not have a fear of causing contamination of melting of sensible-heat adhesives, or the front face of these equipments by softening. Furthermore, the thread rear face where coating of the sensible-heat adhesives is carried out does not have a fear of a thread separating [ sensible-heat adhesives ] also in the outcrop of the thread in the aperture aperture section at the temperature of the desiccation zone of a paper machine, melting or in order to soften and to paste up firmly with a form.

[0015] Moreover, if ultraviolet rays are irradiated at a form, the printing layer c of a thread will color. In the 1st embodiment shown in drawing 6 , coloring of this printing layer c can be seen from a thread front-face side. On the other hand, in the 2nd embodiment shown in drawing 7 , coloring of this printing layer c can be seen from a thread rear-face side through the transparent sensible-heat adhesives layer d. Therefore, in case a thread is inserted at the time of paper milling, even when the table rear face has been inserted in reverse, by detecting coloring by UV irradiation, a thread table rear face can be identified easily, a thread can be reversed promptly, and it can return to a normal insertion condition.

[0016] Since the micro alphabetic character of only a forward alphabetic character and/or the micro image of only a forward image will appear on a thread further again when it sees from the side front of a form, a forward alphabetic character and a reverse alphabetic character can read without sense of incongruity compared with a conventional micro alphabetic character like drawing 11 which intermingles and is visible.

[0017]

[Embodiment of the Invention] It explains with reference to drawing 1 which shows the example of the gift certificate using the forged prevention form which consists the general configuration of the forged prevention form of this invention of two-layer \*\*\*\*\* , and drawing 2 which is the partial expanded sectional view. The illustrated forged prevention form consists of two-layer [ of the paper 2 of an outermost layer of drum, and paper 3 other than an outermost layer of drum ], and the aperture aperture section 1 is intermittently formed in the lengthwise direction (flow direction of the paper at the time of paper making) of a form at the paper 2 of an outermost layer of drum. The thread 4 is inserted between the paper 2 of an outermost layer of drum, and the paper 3 which touches this, and this thread 4 is exposed in the part of the aperture aperture section 1. A paper 2 side turns into a side front of a form. In addition, the water mark which consists of an alphabetic character or an image into the aperture aperture section 1 may be given if needed, and forged prevention ability can be further raised by giving both water marks of a \*\*\*\* lump and alphabetic character of a thread, or an image.



[0018] Next, in order to understand this invention, an example is given and the manufacture approach of a forged prevention form is explained. First, it mixes suitably, beating of wood pulp, such as needle-leaved tree bleached kraft pulp (NBKP), broad-leaved tree bleached kraft pulp (LBKP), and \*\*\*\*\* SARUFAITO pulp (NBSP), hemp, cotton, the non-wood pulp that used straw as the raw material is carried out, a loading material, a desiccation paper reinforcing agent, a humid paper reinforcing agent, a sizing compound, a fixing agent, a yield improver, a filtration improvement agent, a defoaming agent, a color, a color pigment, a fluorescence agent, etc. are suitably added to this, and the pulp usually adjusted to freeness 400 – 250mlC.S.F. be prepared.

[0019] It faces manufacturing a forged prevention form by \*\*\*\*\* more than two-layer, and the multi-tub type cylinder machine currently generally used for manufacture of \*\*\*\*\* from the former can be used.

Drawing 3 shows the example of 2 tub type cylinder machine for manufacturing \*\*\*\*\* which consists of two-layer paper 2 and 3 ( drawing 2 ), and is equipped with the 1st tub (tub before the last tub) 11 for forming paper 3 other than an outermost layer of drum without the aperture aperture section 1, and the 2nd tub (the last tub) 12 for forming the paper 2 of an outermost layer of drum which has the aperture aperture section 1.

[0020] As shown in drawing 4 , attach in upper network 12b of cylinder-mo-ld cylinder 12a of a tub 12 the mold 13 equivalent to the aperture aperture section 1 made from a metal, resin, paper, etc. with a metal thin line, it is soldered to it, or is stuck on it with adhesives. Although the configuration of the mold 13 equivalent to the aperture aperture section is a rectangle in the example of a graphic display, it can be made into the configuration of arbitration, such as a square, a circle, and an ellipse, besides it.

[0021] It faces attaching the mold 13 as shown in upper network 12b of the cylinder-mo-ld cylinder of the tub 12 which forms the paper 2 of an outermost layer of drum at drawing 4 . It is desirable to attach a mold 13 intermittently at spacing which is set to 3:1-1:2 in the ratio of die-length X equivalent to the aperture aperture section 1 in the flow direction (lengthwise direction of a form) of paper shown by the arrow head W and die-length Y equivalent to the non-aperture aperture section 5 ( drawing 1 ) located between the aperture aperture section and the aperture aperture section. The wrinkling prevention effectiveness at the time of rolling round a form in the shape of a roll continuously is not only made certainly, but by making the ratio of the aperture aperture section 1 into this range, the design top on the front face of a form will become desirable.

[0022] Cylinder-mo-ld cylinder 11a of the tub 11 of the cylinder machine of drawing 3 is equipped with the upper network which does not manipulate at all. A blanket 14 transfers to the paper 3 which carried out paper making by cylinder-mo-ld cylinder 11a equipped with the upper network which does not manipulate at all, it is carried on cylinder-mo-ld cylinder 12a which attached the mold 13 of a tub 12, the paper 2 of the outermost layer of drum by which paper making was carried out by this cylinder-mo-ld cylinder 12a piles it up on it, and the form by which two paper was \*\*\*\*\* (ed) is milled. Insertion of a thread 4 is performed in the part of the arrow head V just before paper 3 and paper 2 pile up. The approach of sending a thread into a wall which the same applicant as this application has proposed by above-mentioned JP,5-40080,B as the \*\*\*\* lump approach of a thread 4 using the duct which prepared irregularity etc. is employable. In addition, the mold 13 attached in cylinder-mo-ld cylinder 12a is actually attached in the perimeter of cylinder-mo-ld cylinder 12a intermittently, although it has illustrated and simplified in drawing 3 in some places.

[0023] The forged prevention form of a configuration of having been shown in drawing 1 and drawing 2 by the two-layer \*\*\*\*\* approach mentioned above can be manufactured. That is, the aperture aperture section 1 in which pulp does not ride on the part equivalent to a mold 13 is formed in the paper 2 of the outermost layer of drum by which paper making was carried out by cylinder-mo-ld cylinder 12a which attached the mold 13. By inserting a thread 4 between paper 2 and 3 so that it may enter into the aperture aperture section 1, by the aperture aperture section 1, a thread 4 is exposed and it will be in the condition that the thread was buried between paper 2 and 3, in the non-aperture aperture section 5.

[0024] The forged prevention form of this invention can also be manufactured using a Fortlinear paper machine as shown in drawing 5 R> 5 other than the solve and using multi-tub type cylinder machine \*\*\*\*\* approach mentioned above. That is, the dandy roll 22 which attached in the peripheral surface two or more molds 23 which have a configuration equivalent to the aperture aperture section 1 is contacted to the wet paper web 21 on the paper-making network 20, and it is made to rotate, in order to form the aperture aperture section 1 which made paper thin selectively to the wet paper web 21 on the paper-making network 20 of the Fortlinear paper machine which is moving in the direction of arrow-head W and to insert a thread 4, pressing a wet paper web. A dandy roll 22 is driven so that it may rotate in the direction of an arrow head with a suitable driving gear. If the front face of the wet paper web 21 of a paper-making screen oversize is pressed by the dandy roll 22, as a result of being pushed away by the fiber of a wet paper web, in the part equivalent to a mold 23, the aperture aperture

section 1 of thin paper will be formed. Under the present circumstances, the thread 4 which is supplied to the center section of the mold 23 and is inserted into a wet paper web 21 is exposed in the part of the aperture aperture section 1. Moreover, the non-aperture aperture section 5 ( drawing 1 ) is formed because fiber moves also between adjacent molds 23 and molds 23 and the fiber which moved covers the front face of a thread 4. In addition, instead of attaching a mold 23 in the upper network of a dandy roll 22, the heights of the configuration which is equivalent to the aperture aperture section 1 with \*\*\*\*\* etc. may be formed in the upper network itself.

[0025] The forged prevention form of this invention can also be manufactured by the various approaches except having described above. For example, where it prepared the slot at the head of heights of the guide which has the concavo-convex section and lets a thread pass into this slot as proposed by JP,5-85680,B introduced with the conventional technique as the manufacture approach of "the paper containing aperture aperture yarn" By moving a guide up in the place in which the guide was made to lay underground into the pulp suspension on the wire of a Fortlinear paper machine, the moisture of pulp suspension was caudad dehydrated from the wire, and paper was almost formed As proposed by the approach and JP,6-272200,A which form the aperture aperture section which the thread has exposed in the part which had touched at the head of heights of a guide On the wire of a Fortlinear paper machine, the rotating drum which contained the compressed-air nozzle is installed. By spraying the compressed air on the wet paper web on the wire by which the thread is inserted in the interior intermittently from the compressed-air nozzle in a rotating drum, and blowing away the slurry on a thread As proposed by the approach and U.S. Pat. No. 4462866 which form intermittently the aperture aperture section which the thread exposed in case a network is rotated within the tub into which surface [ a part of ] used the network processed in the shape of irregularity for the upper network of a cylinder machine, and pulp suspension went, while contacting a thread in the concavo-convex section on the front face of a network — \*\*\*\*\* — by things The approach of exposing the thread which was in contact with the heights on the front face of a network in the aperture aperture section etc. is employable.

[0026] It is also possible to face to manufacture the forged prevention form of this invention, and to carry out coating of starch, polyvinyl alcohol, the various surface sizes, etc. to space with size press equipment etc. on the way of [ paper making ]. Furthermore, if needed, machine calender processing and supercalender processing can be performed and it can also perform raising surface smooth nature suitably.

[0027] Next, the manufacture approach of the thread used by this invention is explained. As a film used as the base, various films, such as cellophane, a polypropylene film, polyester film, a nylon film, a polyvinyl alcohol film, a polyvinyl chloride film, and a polycarbonate film, can be used as an original fabric. Although melting or the construction material which is not softened is used for this base film in the desiccation zone of a paper machine, what has the property which is not usually tintured with adhesiveness at the temperature of a 90-110-degree C desiccation zone is desirable. The film which has thermal resistance like polyester film from this reason can use it preferably. Processings various in the range which does not check the object of this invention may be performed to a film. For example, it is carrying out coating of the corona discharge treatment and priming for an improvement of a NURE characteristic, and the transparence resin, and performing hologram embossing processing etc. A thing with a thickness of 8 micrometers - 25 micrometers is usually used for the various films as an original fabric.

[0028] in addition -- the thread by the 1st embodiment shown in drawing 6 -- a base film a -- transparence -- even when -- although it may be opaque, in order to have to make it seen [ the metal vacuum evaporationo layer b and the printing layer c ] from a thread front-face side through a base film a, in the thread by the 2nd embodiment shown in drawing 7 , it is necessary to use a transparent base film

[0029] As an approach of forming the micro alphabetic character which consists of a metal vacuum evaporationo layer b, and a micro image on a base film a, the PASUTA processing method can use it preferably. The approach of drying, after the PASUTA processing method's itself being an approach learned well, for example, dissolving the vacuum-plating-of-aluminium layer which be immersed and have expose the film subsequently to a sodium-hydroxide water solution in addition to a printing part, rinsing [ printing an alphabetic character and an image in ink with alkali resistance to the vacuum evaporationo side of the polyester film which carried out vacuum deposition of the metal aluminum, ] a film subsequently and removing an aluminum hydroxide be a typical example ( JP,63-216795,A etc.). By carrying out like this, a printing part and the lower layer metal vacuum evaporationo part which aligned with the printing part remain as it is on a film, and a film is exposed in the other part.

[0030] It faces manufacturing the thread by the 1st embodiment shown in drawing 6 , and first, a vacuum



deposition machine and a sputtering system are used for the whole front face of a base film a, and the metal vacuum evaporation layer b is formed. Since it dissolves in things and alkali with easy formation easily as a metal vacuum evaporation layer b, the metal vacuum plating of aluminium is suitable. Thickness of the metal vacuum evaporation layer b is usually made into 250-800Å.

[0031] Subsequently, an invisible writing ink with alkali resistance is used, and the printing layer c is formed by printing the micro alphabetic character of a forward alphabetic character, and/or the micro image of a forward image on the metal vacuum evaporation layer b. The micro alphabetic character and micro image at this time may apply ink to parts (black part) other than the part which may apply and form ink in the part (black part) which serves as an alphabetic character and an image like drawing 9, or serves as an alphabetic character and an image like drawing 10 R> 0, and may form the alphabetic character and image of extraction.

[0032] In this invention, it is required to add the color colored by the exposure of ultraviolet rays and a pigment to an invisible writing ink. Moreover, the coloring agent which colors and appears under the white light may be suitably added in ink if needed.

[0033] The film after forming the printing layer c with an invisible writing ink is immersed into a sodium-hydroxide water solution, and the metal vacuum evaporation layer of a part without the printing layer c is dissolved. Subsequently, a film is dried after removing the sodium hydroxide which picks out a film from a sodium-hydroxide water solution, rinses it, and remains on a front face. Of this, the micro alphabetic character of the forward alphabetic character which consists of a metal vacuum evaporation layer b and a printing layer c by the invisible writing ink on it, and/or the micro image of a forward image will be formed in the front face of a base film a. In addition, in this description, vocabulary called "the micro alphabetic character and/or micro image" which consist of a metal vacuum evaporation layer is used like drawing 10 in the semantics also containing the extraction alphabetic character in which the metal vacuum evaporation layer was extracted and formed, or an image.

[0034] Furthermore, melting or the sensible-heat adhesives layer d to soften is formed in the rear face of a base film a at the temperature of the desiccation zone of a paper machine. This sensible-heat adhesives layer d uses well-known sensible-heat adhesives, such as an ionomer resin system, a polyester resin system, a polyvinyl acetate resin system, a polyvinyl chloride resin system, a polyacrylic ester resin system, and an ethylene-vinylacetate copolymer resin system, as the coating of a drainage system or a solvent system, and can form them in the rear face of the various films which serve as an original fabric using idiomatic coaters, such as an air knife coating machine and a gravure coating machine, by carrying out coating. The amount of coating is usually 0.1 - 10 g/m<sup>2</sup>. It carries out. Although each of these sensible-heat adhesives is transparent to extent which may penetrate ultraviolet rays, a coloring agent may be added if needed in the range which does not check transparency.

[0035] In addition, coating of the transparence resin coating layer which has thermal resistance as a protective layer on the surface of a base film as covers a micro alphabetic character and/or micro image top can also be carried out if needed.

[0036] Thus, the thread used for this invention is obtained by usually carrying out the slit of the micro alphabetic character which performs various processings to the table rear face, and consists of a metal vacuum evaporation layer b and a printing layer c and/or a micro image, and the film original fabric which formed the sensible-heat adhesives layer d further to narrow-width [ of 0.3-several mm ] using a micro slitting machine. Under the present circumstances, since a very advanced technique is needed also for this manufacture when a slit is carried out so that it may be exactly located in the center with a cross direction, and a micro alphabetic character and/or a micro image may be arranged, the forged prevention effectiveness increases more.

[0037] The thread of the 1st embodiment which has the configuration of drawing 6 is used inserting in a form so that the field (front face) which has not carried out coating may expose sensible-heat adhesives in the aperture aperture section. When this sees from the side front (side in which the aperture aperture section was formed) of a form, the macro alphabetic character of only a forward alphabetic character and/or the micro image of only a forward image will appear. When the printing layer c is formed using a non-colored invisible writing ink at this time, if the printing layer c is formed using the invisible writing ink which the alphabetic character and the image shone and were visible to the metallic luster color (for example, silver when it is a vacuum-plating-of-aluminium layer) of the metal vacuum evaporation layer b, and was colored yellow, the metallic luster color of the metal vacuum evaporation layer b and the yellow of the printing layer c will lap, and a golden alphabetic character and a golden image will appear. Moreover, when ultraviolet rays are irradiated at a thread, it turns out that the side whose dyes and pigments colored by the ultraviolet rays added to the invisible writing ink can color and be seen



is a thread front face. Since ultraviolet rays are interrupted in the metal vacuum evaporationo layer b which turns into a non-penetrated layer of light substantially even if ultraviolet rays are irradiated by the field (thread rear face) in which the sensible-heat adhesives layer d was formed, from a thread rear face, the printing layer c cannot color and be seen.

[0038] In order to manufacture the thread by the 2nd embodiment shown in drawing 7 Further, the micro image which consists only of forming the metal vacuum evaporationo layer b in the rear face of the transparent base film a, a micro alphabetic character which consists only of a reverse alphabetic character on this metal vacuum evaporationo layer b, and/or a reverse image is printed in ink, and the printing layer c is formed, It can manufacture like the thread manufacture approach of the 1st embodiment except forming the transparent sensible-heat adhesives layer d in the rear face of a base film so that this printing layer c top may furthermore be covered.

[0039] The thread which has the configuration of drawing 7 is used inserting in a form so that the field (thread front face) of a base film a may be exposed in the aperture aperture section. In this case, when it sees from the side front of a form, the micro alphabetic character of the reverse alphabetic character which consists of a metal vacuum evaporationo layer b and a printing layer c, and/or the micro image of a reverse image will appear as a forward alphabetic character and/or forward images through the transparent base film a. When a transparent non-colored base film is used at this time, an alphabetic character and an image shine and are visible to the metallic luster color (for example, silver, when it is a vacuum-plating-of-aluminium layer) of the metal vacuum evaporationo layer b, if the transparent base film colored yellow is used, the metallic luster color of the metal vacuum evaporationo layer b and the yellow of bright film a will lap, and a golden alphabetic character and a golden image will appear. Moreover, since ultraviolet rays are interrupted in the metal vacuum evaporationo layer b which turns into a non-penetrated layer of light substantially when ultraviolet rays are irradiated from the front-face side of a thread, the dyes and pigments colored by the ultraviolet rays added in the ink of the printing layer c cannot color and be seen. Since the dyes and pigments colored by the ultraviolet rays in the ink of the printing layer c can color and be seen through a transparence sensible-heat adhesives layer when ultraviolet rays are irradiated by the field (thread rear face) in which the transparent sensible-heat adhesives layer d was formed on the other hand, it turns out that it is a thread rear face. In addition, in the configuration of drawing 7 , even when the ink which prints the printing layer c is transparent and it is opaque, it is good.

[0040] Since the front flesh side of a thread can be judged simple by the exposure of ultraviolet rays as mentioned above, it is promptly [ certainly and ] discriminable whether the front flesh side of a thread is correctly inserted in the paper-making process. That is, after a thread is inserted in the middle of paper making, it can judge easily whether the front flesh side of a thread is inserted correctly by detecting the existence of coloring by irradiating ultraviolet rays at a wet paper web using the black light. This becomes possible to suppress generating of maculature to the minimum. When viewing, the image pick-up which used CCD can perform the judgment of coloring of a thread automatically and it detects coloring automatically, it is also possible to emit an alarm simultaneously.

[0041] When the front flesh side of a thread is not correctly inserted in the form by the judgment result, it is necessary to reverse a thread insertion condition promptly. After cutting a thread in a thread insertion part as an approach of reversing a thread insertion condition, the manual approach of making reverse a thread and inserting again and the approach of giving a thread inverting function to thread insertion equipment, and performing mechanically can be considered. If you make it the judgment result of coloring of a thread interlocked with when reversing a thread mechanically, a thread can also be reversed automatically.

[0042] In addition, although the above explanation mentioned the forged prevention form containing an aperture aperture thread as the example and mainly explained it, this invention does not have the aperture aperture section in a form, and can be applied also to the forged prevention form containing a thread of the type which the thread is inserted in the interior of a form and does not expose to a form front face. \*\* -- the forged prevention form of the type which a thread [ like ] does not expose puts a perforation into the part by the ticket, an admission ticket, etc., and may be used for an application which tears some tickets along with a perforation In this case, if coating of the sensible-heat adhesives has not been carried out to a thread, in case some tickets are torn, a thread may be dragged out of the interior of a form, without being cut by the perforation. Therefore, also in the forged prevention form containing a thread which a thread does not expose, the forged prevention form of this invention which inserted the thread which has a sensible-heat adhesives layer can use it preferably.

[0043] Furthermore, even if it faces milling the thread necessity paper of the type which a thread does not expose, by making the wet paper web after thread insertion irradiate or penetrate ultraviolet rays, and observing coloring of the printing layer of a thread, the front flesh side of a thread can be judged and it becomes possible to control the insertion condition of the thread inside a form correctly.

[0044] Next, the example of manufacture of the thread used by this invention is explained more to a detail. Each of amounts of coating in these examples of manufacture and coating thickness means the value after desiccation.

[0045] After vapor-depositing 400-500Å of metal aluminum on the whole front face of polyester film a with a [example of manufacture of thread containing micro alphabetic character which looks silver (refer to drawing 6 )] thickness of 12 micrometers and forming the vacuum-plating-of-aluminium layer b in it, Furthermore on this vacuum-plating-of-aluminium layer b, the printing layer c of the micro alphabetic character (refer to drawing 9 ) which consists of a forward alphabetic character using a photogravure printing machine was formed using the alkali-proof invisible writing ink which consists of acrylic resin of 2 liquid hardening mold which added the fluorescent dye of a thiophene system 0.5% of the weight. In the micro graphic size, spacing of 1mm, an alphabetic character, and an alphabetic character set spacing of 1mm, a character string, and a character string to 2mm. Subsequently, after dissolving vacuum-plating-of-aluminium layers other than the part which was immersed in the sodium-hydroxide water solution in this film, and formed the printing layer c, rinsing the sodium hydroxide on ejection and the front face of a film and removing a film from a sodium-hydroxide water solution, it dried. Furthermore, coating of about 5 micrometers of the sensible-heat adhesives was carried out to the rear face of polyester film a, and the sensible-heat adhesives layer d was formed. Subsequently, by [ of a character string and a character string ] carrying out a slit in the center exactly, the thread to which a character string is located in the center was manufactured using the micro slitting machine. The thread was rolled round in the bobbin.

[0046] The thread of the configuration of drawing 6 was manufactured like the example of manufacture of the thread containing a micro alphabetic character which is visible to the above-mentioned silver except having made to have added the yellow color in the [example of manufacture of golden thread containing extraction micro alphabetic character (to refer to drawing 6 )] invisible writing ink, and a micro alphabetic character into the extraction alphabetic character (ink being printed into parts other than an alphabetic character, and only an alphabetic character part not being printed in ink) which consists of a forward alphabetic character like drawing 10 . Since the silver of the vacuum-plating-of-aluminium layer b can be seen through the yellow of the invisible writing ink of the printing layer c, this thread can be seen as a golden extraction micro alphabetic character.

[0047] After carrying out coating of about 2 micrometers of the transparent thermoplastics to the rear face of transparent polyester film a with a [example of manufacture of hologram thread containing micro alphabetic character (refer to drawing 8 )] thickness of 12 micrometers and forming the thermoplastics coating layer e in it, heat embossing of the hologram pattern f was carried out on this. On the hologram pattern f obtained in this way, the vacuum-plating-of-aluminium layer b was formed. Subsequently, on this vacuum-plating-of-aluminium layer b, the micro alphabetic character which consists of a reverse alphabetic character was printed using the alkali-proof invisible writing ink, and the printing layer c was formed. Subsequent actuation formed the micro alphabetic character of the reverse alphabetic character which consists of a printing layer c and a vacuum-plating-of-aluminium layer b which aligned like the example of manufacture of the thread containing a micro alphabetic character which is visible to the above-mentioned silver. Subsequently, as this reverse alphabetic character top was covered, coating of the transparent sensible-heat adhesives was carried out, the sensible-heat adhesives layer d was formed, and the thread was manufactured. If the thread of this configuration is seen from the a-th page (thread front face) side of polyester film, the micro alphabetic character of a forward alphabetic character can check it by looking as a hologram pattern through transparence polyester film a and the transparence thermoplastics coating layer e.

[0048]

[Effect of the Invention] According to the forged prevention form of this invention which was mentioned above, remarkable effectiveness which is described below is acquired.

1) When ultraviolet rays are irradiated at a thread, by judging, discernment on the rear face of a table of a thread can perform simply whether the printing layer of a thread can color and be seen. Consequently, it can detect promptly whether insertion of the thread at the time of paper making is made correctly, a thread insertion condition can be promptly judged in the phase where the thread was inserted in the middle of paper making, when not right, promptly, front flesh-side reversal can be carried out and a thread insertion condition can be



returned to normal. Therefore, a thread becomes possible [ raising remarkably the yield of manufacture of the forged prevention form inserted correctly ].

[0049] 2) Since coating of the sensible-heat adhesives was carried out only to one side (thread rear face) of a thread, these equipments are not polluted with sensible-heat adhesives, even if it contacts the cylinder dryer of a desiccation zone, canvas, a touch roll, etc. by controlling the thread insertion at the time of paper making so that a sensible-heat adhesives non-coating side (thread front face) may be exposed to the aperture aperture section of a form. Furthermore, even if a cost cut not only becomes possible, but it faces sensible-heat adhesives the manufacture to both sides as compared with the conventional thread which carried out coating, special equipment is not needed, but there is an advantage which can use the usual coater.

[0050] 3) Since the micro alphabetic character of only a forward alphabetic character and/or the micro image of only a forward image appear on a thread when it sees from the side front of a form, it can read without sense of incongruity. In order to make it only such a forward alphabetic character and/or a forward image appear, on the occasion of the thread insertion at the time of paper making, the thread which can perform distinction on the rear face of a table must be used, and since a technique advanced for that purpose is needed, the forged prevention effectiveness increases by leaps and bounds.

[0051] 4) Since the printing layer of a thread can color and be seen when ultraviolet rays are irradiated at a form, truth or falsehood can be judged easily. Moreover, if the form which inserted the thread using the base film of transparence is spaced and seen, since light will not penetrate the part of metal \*\*\*\* of a thread but the other part will penetrate light, it is checked by looking as a kind of water mark, and the forged prevention effectiveness increases further.

[0052] 5) If a copying machine copies this at the same time design nature increases since the metallic luster color of a metal vacuum evaporation layer can be seen from a form side front, since a metallic luster color cannot be copied, the forged prevention effectiveness will increase.

[0053] The forged prevention form obtained by this invention taking advantage of the above properties can be used suitable for a bill, a check, a stock certificate, a debenture, a gift certificate, a card, secret papers, a passport, an identification card, etc.

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[Translation done.]